Docket No.: 2002P87059WOUS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Fufang Zha et al.
Serial No:	10/537,760
Confirmation No:	5173
Filed:	June 6, 2005
Title:	MIXING CHAMBER
Examiner:	Menon, Krishnan S.
Art Unit:	1797

CERTIFICATE OF TRANSMISSION UNDER 37 C.F.R. § 1.8(a)

The undersigned hereby certifies that this document is being electronically filed in accordance with § 1.6(a)(4), on the 6th day of October, 2010.

/Gregory Gerstenzang/
Gregory Gerstenzang, Reg. No. 59,513

Commissioner for Patents

APPEAL BRIEF UNDER 37 C.F.R. § 41.37

Dear Sir:

This Appeal Brief is filed in response to the Final Office Action mailed on May 19, 2010 (the "Office Action") in view of the Advisory Action mailed July 15, 2010 (the "Advisory Action") and in furtherance of the Notice of Appeal filed on August 6, 2010. The fee of $540 under 37 C.F.R. § 41.20(a)(2) accompanies this filing.

TABLE OF CONTENTS

I. REAL PARTY IN INTEREST (37 C.F.R. § 41.37(c)(1)(i))

The real party in interest is the assignee of the instant application, namely Siemens Water Technologies Corp., a Massachusetts corporation with a place of business at 181 Thorn Hill Road, Warrendale, Pennsylvania 15086.

II. RELATED APPEALS AND INTERFERENCES (37 C.F.R. § 41.37(c)(1)(ii))

There are no appeals or interferences known to Appellants, Appellants' legal representative, or the assignee of the instant application that will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS (37 C.F.R. § 41.37(c)(1)(iii))

Claims 1-53 were pending in the application as filed on June 6, 2005. Claims 1, 3-10, 12, 14-22, 29, 32, 34, 40-43, 45, and 47-49 were amended in a Preliminary Amendment filed June 6, 2005. Claims 23-34, 36-39, and 49-53 were withdrawn in an Amendment filed on February 11, 2008. In a Response filed on May 15, 2008, no claims were amended. In an Amendment filed on December 30, 2008, claims 1-9, 12-22, 35, and 40-48 were amended. In an Amendment filed on March 13, 2009, claims 1, 12, 35, 40, and 41 were amended and claims 4, 5, 15, and 16 were canceled. In an Amendment filed on September 21, 2009, claims 1, 12, 35, 40, and 41 were amended and claims 7, 8, 18, and 19 were canceled. In an Amendment filed on January 19, 2010, claims 1-3, 6, 9-12, 35, 40, and 41-48 were amended. In a Response filed on May 11, 2010, no claims were amended. In a Response filed on July 9, 2010, no claims were amended. Claims 1-3, 6, 9-14, 17, 20-22, 35, 40-48, and 54-56 currently stand rejected, with claims 1, 12, 35, 40, and 41 being in independent form. Claims 1-3, 6, 9-14, 17, 20-22, 35, 40-48, and 54-56 are being appealed herein.

IV. STATUS OF AMENDMENTS (37 C.F.R. § 41.37(c)(1)(iv))

No claims were amended in a Response filed July 9, 2010. A copy of the claims as pending, incorporating all prior amendments and showing the status of each of the claims, is attached as a Claims Appendix beginning on page 20 of this Appeal Brief.

V. SUMMARY OF CLAIMED SUBJECT MATTER (37 C.F.R. § 41.37(c)(1)(v))

Aspects and examples of the claimed subject matter are generally directed to apparatus for filtering liquid. In one example, a membrane filtration apparatus is claimed. The apparatus generally includes a plurality of membrane filtration modules, each membrane filtration module comprising a plurality of porous membranes extending in an array, said plurality of porous membranes encased in a support structure and having lower ends mounted in a lower pot supported by a lower header and upper ends mounted in an upper pot supported by an upper header, said upper header configured to provide for permeate to be withdrawn from said upper ends of said plurality of porous membranes, and a plurality of distribution apertures defined in said lower pot, said distribution apertures configured to distribute a scrubbing fluid into said module and along a surface or surfaces of said membranes. The apparatus further includes a single manifold coupled to said lower header of each of said plurality of membrane filtration modules and a single chamber positioned below, and connected to, said manifold, said chamber constructed and arranged to promote upward flow of feed liquid therethrough. The chamber comprises an open base end in fluid communication with a source of feed liquid, a second end in fluid communication with said distribution apertures, and a single gas inlet constructed and arranged to introduce gas into said chamber in a downward direction from above the open base end, said gas fed from above and through said manifold and into said chamber, said gas inlet centered between at least two of said plurality of membrane filtration modules and configured to release gas into said chamber at a position vertically displaced below said at least two of said plurality of membrane filtration modules. The chamber is configured to mix gas and liquid to produce said scrubbing fluid and further configured to distribute said scrubbing fluid to said distribution apertures. (See Applicants' specification as originally filed at page 3, lines 3 – 21, page 7, lines 5 – 17, page 4, lines 17 – 23, page 12, line 8 – page 13, line 5, and FIG. 2.)

In another example, an assembly of membrane modules is claimed. The assembly of membrane modules generally includes a plurality of porous membranes extending in an array and having lower ends mounted in a plurality of lower pots supported by a plurality of respective lower headers, and upper ends mounted in a plurality of upper pots supported by a plurality of respective upper headers, said lower pots being configured to provide a number of distribution apertures therein for distributing a scrubbing fluid into said assembly of membrane modules and along a surface or surfaces of said membranes, said lower headers coupled to a manifold and a

chamber positioned below and connected to said manifold, said chamber constructed and arranged to promote upward flow of feed liquid therethrough. The chamber comprises an open base end in fluid communication with a source of feed liquid, a second end in fluid communication with said distribution apertures, and a gas inlet constructed and arranged to introduce gas into said chamber in a downward direction from above the open base end, said gas fed from above and through said manifold. The chamber is configured to mix gas and liquid to produce said scrubbing fluid and further configured to distribute said scrubbing fluid to said distribution apertures. (See Applicants' specification as originally filed at page 3, lines 3 – 21, page 4, lines 17 – 23, page 7, lines 5 – 17, page 12, line 8 – page 13, line 5, and FIG. 2.)

In another example, a membrane filtration apparatus is claimed. The membrane filtration apparatus generally includes a plurality of membrane filtration modules, each membrane filtration module comprising a plurality of porous membranes, said membranes being arranged in close proximity to one another and having lower ends mounted in a lower pot supported by a lower header and upper ends mounted in an upper pot supported by an upper header, said upper header configured to provide for permeate to be withdrawn from said upper ends of said porous membranes, a manifold coupled to said lower headers, an open-ended mixing chamber constructed and arranged to provide a cleaning mixture by mixing together liquid and gas bubbles, said chamber immersed in a feed tank and having an open base in fluid communication with a source of feed liquid, said chamber constructed and arranged to promote upward flow of feed liquid therethrough, a gas source positioned within the open-ended mixing chamber, the gas source constructed and arranged to introduce gas through a single gas inlet into the open-ended mixing chamber in a downward direction from above the open base, said gas fed from above and through said manifold and into said chamber, said single gas inlet centered within said plurality of membrane modules, and means for flowing said cleaning mixture along a surface of said membranes to dislodge fouling materials therefrom. (See Applicants' specification as originally filed at page 3, lines 3 – 21, page 4, lines 17 – 23, page 7, lines 5 – 17, page 12, line 8 – page 13, line 5, and FIG. 2.)

In another example, a membrane bioreactor is claimed. The membrane bioreactor generally includes a plurality of membrane filtration modules, each membrane filtration module comprising a plurality of porous hollow membrane fibres extending longitudinally between and mounted between an upper and a lower potting head, said membrane fibres being arranged in

close proximity to one another, said fibres being partitioned into a number of bundles at least at or adjacent to their respective potting head so as to form a space therebetween, a header in which the lower potting head is supported, a manifold coupled to the header, an open-ended mixing chamber positioned below the lower potting head, said chamber constructed and arranged to promote upward flow of feed liquid therethrough, said chamber having an open base in fluid communication with a source of feed liquid, and a gas inlet positioned within the open-ended mixing chamber, the gas inlet spaced from and surrounded by side walls of the open-ended mixing chamber and configured to feed gas into the open-ended mixing chamber from above and through said manifold. At least one of said potting heads includes an array of openings formed therein in fluid communication with said chamber constructed and arranged to provide gas bubbles within said module such that, in use, said bubbles move past the surfaces of said membrane fibres to dislodge fouling materials therefrom. (See Applicants' specification as originally filed at page 3, lines 3 – 21, page 4, lines 17 – 23, page 7, lines 5 – 17, page 8, line 10 – page 9, line 4, page 12, line 8 – page 13, line 5, and FIG. 2.)

In another example, an assembly of membrane modules for use in a membrane bioreactor is claimed. The assembly of membrane modules generally includes a plurality of porous hollow membrane fibres extending longitudinally between and mounted between an upper and a lower potting head, said membrane fibres being arranged in close proximity to one another, said fibres being partitioned into a number of bundles at least at or adjacent to their respective potting head so as to form a space therebetween, a header in which the lower potting head is supported, a manifold coupled to the header, an open-ended mixing chamber positioned below the lower potting head, said chamber constructed and arranged to promote upward flow of feed liquid therethrough, said chamber having an open base in fluid communication with a source of feed liquid, and a gas inlet positioned within the open-ended mixing chamber, the gas inlet spaced from and surrounded by side walls of the open-ended mixing chamber, and centrally located within the open-ended mixing chamber and configured to feed gas into the open-ended mixing chamber from above and through said manifold. The potting heads are configured to provide a number of distribution apertures therebetween in fluid communication with said chamber for providing gas bubbles within said assembly of membrane modules such that, in use, said bubbles move past the surfaces of said membrane fibres to dislodge fouling materials therefrom. (See

Applicants' specification as originally filed at page 3, lines 3 – 21, page 4, lines 17 – 23, page 7, lines 5 – 17, page 8, line 10 – page 9, line 4, page 12, line 8 – page 13, line 5, and FIG. 2.)

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL (37 C.F.R. § 41.37(c)(1)(vi))

Whether each of claims 1-3, 6, 9-14, 17, 20-22, 35, 40-48, and 54-56 are unpatentable over the combination of U.S. Patent Application Pub. No. 2005/0006308 (hereinafter "Cote '308"), claiming priority to U.S. Provisional Patent Application No. 60/278,007 to Cote et al. (hereinafter "the Cote Provisional") and U.S. Patent Application Pub. No. 2001/0047962 to Zha et al. (hereinafter "Zha"), whether each of claims 1-3, 6, 9-14, 17, 20-22, 35, 40-48, and 54-56 are unpatentable over the combination of Zha and U.S. Patent No. 5,482,625 to Shimizu (hereinafter "Shimizu") as further evidenced by Cote '308, and whether each of claims 1-3, 6, 9-14, 17, 20-22, 35, 40-48, and 54-56 are unpatentable over the combination of Zha and/or Cote '308 in view of Shimizu, and further in view of U.S. Patent No. 5,783,083 to Henshaw (hereinafter "Henshaw").

VII. ARGUMENT (37 C.F.R. § 41.37(c)(1)(vii))

For the reasons provided below, the Examiner's rejections are improper and should be reversed. Each of claims 1-3, 6, 9-14, 17, 20-22, 35, 40-48, and 54-56 as presented, is allowable.

A. Each of claims 1-3, 6, 9-14, 17, 20-22, 35, 40-48, and 54-56 is patentable over the asserted combinations of Cote '308 in view of Zha and Zha in view of Shimizu and allegedly further evidenced by Cote '308.

The Cote Provisional and Shimizu are substantially cumulative with regard the features disclosed therein which are relied on by the Examiner in support of the above rejections. As such, the rejections over Cote '308 in view of Zha and over Zha in view of Shimizu as further evidenced by Cote '308 will be addressed together.

There can be no *prima facie* case of obviousness of claims 1-3, 6, 9-14, 17, 20-22, 35, 40-48, and 54-56 over Cote '308 in view of Zha, or over Zha in view of Shimizu and further evidenced by Cote '308 because one of ordinary skill in the art would not have been motivated to

have combined Cote '308 and Zha, or Zha and Shimizu in the manner asserted by the Examiner *ab initio*. Further, even if the cited references were properly combinable in the manner asserted by the Examiner, these asserted combinations would still fail to disclose or suggest each and every element of any of these claims.

1. Cote '308 is not proper prior art.

The Examiner asserts on page 11 of the Office Action that Cote '308 discloses a single mixing chamber providing gas to a plurality of modules at FIGS. 3 and 7. Cote '308, in which the figures the Examiner refers to appear, was filed after the priority date of Dec. 5, 2002 of the present application. These figures are not, however, present or described in the Cote Provisional, filed March 23, 2001 to which Cote '308 claims priority. Clearly, the Cote Provisional does not "contain a written description of the invention and the manner and process of making and using it, in such full, clear, concise, and exact terms ... to enable an ordinarily skilled artisan to practice the invention claimed in the non-provisional application." New Railhead Manufacturing, L.L.C. v. Vermeer Manufacturing Company and Earth Tool Company, L.L.C., 298 F.3d 1290, 1294 (Fed. Cir. 2002). Thus, Cote '308 cannot constitute prior art with respect to the present application for the asserted purposes.

It is axiomatic and a fundamental rule of patent law that an application claiming priority to a provisional application under 35 U.S.C. § 119(e) is only entitled to the benefit of the filing date of the provisional application for material which is actually disclosed in the provisional application. In asserting that Cote '308 is entitled to the benefit of the filing date of the Cote Provisional for a disclosure which is not present in the Cote Provisional, the Examiner is ignoring both the patent statutes and this fundamental rule of patent law.

As Cote'038 cannot constitute prior art with respect to the present application for the asserted purposes, and as Cote '308 is relied on for all of the rejections set forth in the Office Action, none of these rejections are valid.

2. Neither Cote '308 and Zha, nor Zha and Shimizu allegedly further evidenced by Cote '308, are properly combinable *ab initio*.

i. One of ordinary skill in the art would have been dissuaded from making the asserted combinations of references.

The Examiner asserts on page 4 of the Office Action that one of ordinary skill in the art would have been motivated to include the air distribution system of Cote '308 into the apparatus of Zha because this would allow air to flow to the roots of the fibers. The Examiner further asserts on page 6 of the Office Action with respect to incorporating the air distribution system of Shimizu into the apparatus of Zha that having an air line into the chamber to provide for the air outlet, and how to place the air line with respect to the header or the membranes would be obvious to one of ordinary skill, and could be designed based on convenience.

Neither of these assertions establishes a valid motivation to combine Cote '308 and Zha, or Zha and Shimizu as asserted by the Examiner.

One of ordinary skill in the art would not have been motivated upon a reading of Zha to have replaced the venturi device of Zha with the air distribution pipe 3 of Cote '308 or to have modified the air nozzle disclosed in Zha so that it was inverted in the fluid flow path, as this would have negated the benefits of using a venturi device as disclosed in Zha. Zha acknowledges that gas may be injected by means of a blower "into a liquid system where a membrane module is submerged to form gas bubbles" as is disclosed in Cote '308, however criticizes such a method and discloses that such a method gives rise to numerous disadvantages which are alleviated through the use of a venturi device instead of an air blower. (Zha at paragraphs [0004], [0041], [0045], and [0046].)[1] One of ordinary skill in the art would not have

[1] These methods "consume[] large amounts of energy, possibly form[] mist or froth flow reducing effective membrane filtration area, and may be destructive to membranes. Moreover, in an environment of high concentration of solids, the gas distribution system may gradually become blocked by dehydrated solids or simply be blocked when the gas flow accidentally ceases." (Zha at paragraph [0004].) "If the gas is directly injected into a pipe filled with a liquid, it is possible that the gas will form a stagnant gas layer on the pipe wall and therefore gas and liquid will bypass into different parts of a module, resulting in poor cleaning efficiency." (Zha at paragraph [0046].)

modified Zha as asserted in the Office Action because this would have resulted in the disadvantages disclosed in Zha without providing any compensating advantage.

The Examiner further asserts on page 9 of the Office Action that replacing the venturi device of Zha with the air diffuser of Shimizu is obvious because "incorporating known elements in a combination is prima facie obvious." This is not, however, the law regarding obviousness. A patent "composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 418 (2007). "'[V]irtually all [inventions] are combinations of old elements.' . . . [R]ejecting patents solely by finding prior art corollaries for the claimed elements would permit an examiner to use the claimed invention itself as a blueprint for piecing together elements in the prior art to defeat the patentability of the claimed invention. Such an approach would be 'an illogical and inappropriate process by which to determine patentability.'" In re Rouffet, 149 F.3d 1350, 1357 (Fed. Cir. 1998) (internal citations omitted). See also MPEP § 2143.01 ("A statement that modifications of the prior art to meet the claimed invention would have been 'well within the ordinary skill of the art at the time the claimed invention was made' because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references.")

With regard to the Examiner's assertion on page 6 of the Office Action that having an air line into the chamber to provide for the air outlet, and how to place the air line with respect to the header or the membranes would be obvious to one of ordinary skill, and could be "designed based on convenience," Applicants respectfully disagree. Notably, as discussed in further detail below, there is no plurality of membrane modules and no manifold disclosed in any of Cote '308, Zha, or Shimizu which one could place an air line with respect to "based on convenience."

Applying the Examiner's rationale, if one were designing a membrane filtration system including multiple membrane modules according to any of Cote '308, Zha, or Shimizu, as a matter of "convenience," one would simply include multiple modules as disclosed in Cote '308, Zha, or Shimizu, each module including its own mixing chamber and air inlet. It would be far less "convenient" to attempt to design a manifold and air distribution system as claimed in the present application and redesign the modules of any of Cote '308, Zha, or Shimizu to function with such a manifold and air distribution system. This is because, as explained in Applicants'

previous response[2], it would be far from trivial to perform such a redesign of the modules of any of Cote '308, Zha, or Shimizu. Performing such a redesign would require significant experimentation to obtain a functional multi-module filtration system, if it were even possible to design such a multi-module filtration system using the modules of any of Cote '308, Zha, or Shimizu so that it could operate for its intended purpose.

If the standard for establishing obviousness included an assertion by an Examiner that a modification to a disclosed apparatus could be "designed based on convenience," this would totally discount any engineering that would have been required to make the invention. In the present invention, use of, for example, "a single gas inlet . . . centered between at least two of said plurality of membrane filtration modules and configured to release gas into said chamber at a position vertically displaced below said at least two of said plurality of membrane filtration modules" as recited in claim 1 or a "single gas inlet centered within said plurality of membrane modules" as recited in claim 35 necessarily included a calculus of gas flow requirements to provide a homogenous distribution of scouring gas to the plurality of membrane modules. If a gas inlet used to supply aeration gas to a plurality of membrane modules were placed in a position relative to a plurality of membrane modules that was simply "convenient," uneven distribution of scouring gas among the membrane modules would likely result. For example, in Cote '308 where multiple membrane assemblies 134 are shown mounted above a single air distribution pipe 3 in an aerator shell 112A, 112B, 112C (Cote '308 at FIG. 3), the membrane assemblies are oriented along a single line. This arrangement of membrane modules would invariably result in an uneven distribution of gas to the modules, especially as between modules directly above the gas distribution pipe and those at the periphery of the aerator shell. This would provide decreased aeration efficiency because the aeration time would have to be set for a time that was longer than necessary to properly aerate the centrally located modules so that the peripherally located modules would be provided with sufficient gas to be properly scoured. Alternatively, the peripheral modules would not be cleaned as well as the centrally located modules, reducing the efficiency of the filtration operation. Such an uneven distribution of air among multiple membrane modules is not a problem with the apparatus as claimed in the present application as the plurality of filtration modules are arranged equidistant from the gas inlet.

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[2] Applicants' Response filed May 11, 2010.

Further, the claimed invention is not simply the "replication of the single" as asserted in the Advisory Action. A "replication of the single" of the filtration modules of any of Cote '308, Zha, or Shimizu, would comprise multiple filtration modules, each module including its own mixing chamber and air inlet. In contrast, the claims of the present application recited multiple filtration modules mounted above a single mixing chamber and supplied with aeration gas from a single gas inlet. This avoids the disadvantages of having to provide additional piping and multiple mixing chambers that would be present in a system where the filtration modules of any of Cote '308, Zha, or Shimizu were simply replicated.

As such, one of ordinary skill in the art would not, upon a reading of any of Cote '308, Zha, and Shimizu, alone or in combination, have been motivated to have performed such a fundamental restructuring of the apparatus disclosed in these references. There would be no reasonable expectation of success in doing so, this would fundamentally have altered the structure and function of the apparatus disclosed, and there is no suggestion of any benefit to doing so in any of Cote '308, Zha, and Shimizu.

ii. The Examiner relies on conclusory statements without articulated reasoning in support of the assertion of the combinability of the cited references.

As stated in the MPEP at § 2141, "35 U.S.C. 132 requires that the applicant be notified of the reasons for the rejection of the claim so that he or she can decide how best to proceed. . . . The key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. . . . '[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.' *KSR*, 550 U.S. at ___, 82 USPQ2d at 1396." Further, as sated in the MPEP at § 2143.03, "All words in a claim must be considered in judging the patentability of that claim against the prior art." To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. Fresenius USA, Inc. v. Baxter Int'l, Inc., 582 F.3d 1288 (Fed. Cir. 2009); In re Royka, 490 F.2d 981 (CCPA 1974).

In the Office Action, the Examiner uses only conclusory language to state that all of the claims of the present application are obvious over the cited references. The Examiner does not show where each element of any of the claims of the present application can be found in or can be rendered obvious by the cited references, alone or in combination. For example, in the rejection of claims 1-3, 6, 9-14, 17, 20-22, 35, 40-48, and 54-56 under 35 U.S.C. § 103(a) as being unpatentable over Cote '308 in view of Zha beginning on page 2 of the Office Action, the Examiner does not point to a single element of even a single claim of the application that is allegedly made obvious by the asserted combination of references. The Examiner only cursorily describes the disclosure of Cote '038 and concludes that:

> It would be obvious to combine the teachings of Zha and Cote to arrive at applicant's invention because of the advantages of the Cote air distribution system (advantages of the cyclical low and high flow of air) with the Zha design allowing air to flow to the roots of the fibers. The membrane support system is also well known and is not a patentable difference. One would have the support system such as a cage to prevent excessive lateral movements of the fibers that could lead to fiber damage. (Office Action at page 4.)

The rejection of claims 1-3, 6, 9-14, 17, 20-22, 35, 40-48, and 54-56 under 35 U.S.C. § 103(a) over Zha and/or Cote '308 in view of Shimizu, and further in view of Henshaw beginning on page 9 of the Office Action also fails to point to a single element of even a single claim of the application that is allegedly made obvious by the asserted combination of references. This rejection consists in its entirety of the following:

> Some of the claims in the above list differ from the teaching of Heine [*sic*] and/or Zha in having plural modules arranged in differently shaped manifolds. Henshaw teaches plurality of submerged membrane modules arranged in manifolds to have enlarged capacity treatment systems. It would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of Henshaw in the teaching of Hein [*sic*] or Zha for the purpose of having larger treatment systems/reactors as taught by Henshaw. (Office Action at page 9.)

By using such conclusory language, the Examiner has failed to clearly articulate the reasons why the claimed invention would have been obvious, and thus has not satisfied the burden of establishing a *prima facie* case of obviousness of any of the claims of the present application as set forth in the MPEP.

iii. The Examiner improperly relies on hindsight reasoning in support of the assertion of the combinability of the cited references.

Upon a reading of Cote '308, Shimizu, and Zha, one of ordinary skill in the art would have been dissuaded from performing the modifications asserted by the Examiner because, as disclosed by Zha, these modifications would have led to numerous disadvantages. The only way that the Examiner can combine these references to reconstruct the claims of the present application is through hindsight reconstruction using knowledge gleaned from the present disclosure as a roadmap.

Each of Zha, Cote and Shimizu disclose devices constructed and operating in significantly different manners. For example, Shimizu discloses an apparatus using plate-like rigid membrane cartridges 5 rather than fiber membranes 6 as in Zha. Cote discloses an inverted air box 2 for distributing aeration gas to a membrane module, as opposed to Shimizu, which provides no air distribution structure other than a tubular diffuser 7. Zha disclose a venturi device 12 for mixing air and into liquid entering a membrane module 5, in contrast to the air blowers of Cote and Shimizu. In choosing individual pieces of three different references, each disclosing an apparatus constructed and functioning in a significantly different manner, the Examiner is clearly using knowledge gleaned from the present disclosure as a roadmap to reconstruct the claims of the present application. This is an impermissible use of hindsight analysis which cannot form the basis of a valid rejection under 35 U.S.C. § 103. See Innogenetics, N.V. v. Abbott Labs., 512 F.3d 1363 (Fed. Cir. 2008) (citing Graham v. John Deere Co., 383 U.S. 1, 36 (1966)) (discussing "the importance of guarding against hindsight… and resist[ing] the temptation to read into the prior art the teachings of the invention in issue" when considering the obviousness of a patent); W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 1553 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984); Ex parte Gilham, No. 2009-000691 (BPAI Dec. 3, 2009) (reversing an Examiner's obviousness rejection for using

impermissible hindsight and providing only a conclusory statement in support of why one of skill in the art would make an asserted combination of references); MPEP § 2141.01 III.

The rejection of claims 1-3, 6, 9-14, 17, 20-22, 35, 40-48, and 54-56 involves clear error because there is no suggestion to combine the teachings of Cote '308, Zha, or Shimizu as asserted by the Examiner, apart from improperly using Applicants' disclosure as a template for a hindsight reconstruction of Applicants' claims.

Accordingly, the Examiner has committed clear error by improperly utilizing conclusory statements and hindsight reasoning in support of his opinion as to why the asserted combination of references would have been obvious. The Examiner has failed to rebut Applicants' previously presented reasoning as to why one of ordinary skill in the art would have found it undesirable to make the asserted combination. As such, the Examiner has failed to establish that the cited references are properly combinable in the manner asserted.

3. Even if the asserted combinations of references were valid, the asserted combinations still fail to teach each and every element of the present claims.

Even if the cited references could have been validly combined in the manner asserted by the Examiner, all elements of the claims of the present application still would not be found in the asserted combinations of references.

The Cote Provisional discloses a single membrane module (membrane assembly 1) into which gas is fed by a single gas inlet (air distribution pipe 3) through a single mixing chamber (air box 2). In contrast to the gas inlet structure disclosed in independent claims 1, 12, 35, 40, and 41, the Cote Provisional discloses a gas inlet which enters a mixing chamber located directly below a membrane module from a horizontal direction. (Cote Provisional at FIG. 1 and the discussion thereof). A single mixing chamber is associated with a single membrane module. (Cote Provisional at paragraphs [0010] and [0012] and FIG. 1). There is no disclosure or suggestion in the Cote Provisional of any way in which the disclosed membrane module and mixing chamber could be combined with other membrane modules and mounted in a single manifold, nor any other way in which the air inlet might be introduced into the mixing chamber. The Cote Provisional does not teach or suggest how multiple membrane modules could have

been combined to form a structure including a plurality of membrane modules coupled to a single manifold and mixing chamber including a single air inlet. One of ordinary skill in the art would thus have believed that to provide a filtration system including a plurality of membrane modules according to the Cote Provisional, each membrane module would be provided with its own mixing chamber and air inlet.

As discussed above, FIGS. 3 and 7 of Cote '308, which the Examiner relies on as part of the rejection of all of the claims of the present application are not described in the Cote Provisional, and thus cannot constitute prior art with respect to the present application.

Shimizu discloses a submerged flat membrane system having aeration provided by an air inlet (air diffuser 504) located directly beneath a group of flat membrane cartridges 502. (Shimizu FIG. 25). Aeration gas from diffusing ports on the air inlet is directed downward before it travels upward to scour the membranes. (Shimizu at Col. 12, lines 38-40; FIG. 25). The flat membrane cartridges 502 form a single membrane module (the flat membrane cartridges 502 are mounted in a single box frame 501.) (Shimizu FIG. 25). In contrast to the gas inlet structure disclosed in independent claims 1, 12, 35, 40, and 41, and like the air inlet disclosed in Cote, the air inlet disclosed in Shimizu enters a region directly below a single membrane module from a horizontal direction (Shimizu FIGS. 24 and 25). There is no disclosure or suggestion in Shimizu of any way multiple membrane modules (multiple box frames 501) could be mounted together in a single manifold, nor any other way in which the air inlet could be introduced into the membrane module. One of ordinary skill in the art would thus have believed that to provide a filtration system including a plurality of membrane modules according to Shimizu, each membrane module would be provided with its own mixing chamber and air inlet.

In contrast to plurality of membrane modules mounted in a single manifold above a mixing chamber including the gas inlet structure disclosed in independent claims 1, 12, 35, 40, and 41, Zha discloses a membrane filtration module in which a "venturi device 12 intakes gas through inlet 13 [and] mixes or entrains the gas with liquid flowing through feed inlet 14" (Zha at paragraph [0041]). In all of the embodiments of the membrane filtration module disclosed in Zha, an air inlet integral to a wall of a venturi device 12 (Zha at FIG.1) which may comprise a jet assembly chamber 16, 57 (Zha at FIGS. 2 and 9), is disclosed as introducing air from a side of the membrane filtration module and perpendicular to an upward flow of feed from a feed inlet. The gas inlet 13 and the mixing chamber are integral to a single membrane module. There is no

disclosure or suggestion in Zha that multiple membrane modules could be mounted together in a single manifold and supplied with a liquid/gas mixture from a single mixing chamber or a single gas inlet. One of ordinary skill in the art would thus have believed that to provide a filtration system including a plurality of membrane modules according to Zha, each membrane module would be provided with its own mixing chamber and air inlet.

None of the Cote Provisional, Zha, or Shimizu disclose or contemplate a plurality of membrane modules coupled through a single manifold to a single mixing chamber including a gas inlet passing into the mixing chamber through the manifold from above as recited in each of the independent claims of the present application. As such, no combination of Cote '308, Zha, and Shimizu can disclose these elements of the claims of the present invention.

Notably, each of Cote '308, Zha, and Shimizu, alone or in combination, fail to disclose or suggest a manifold coupled to lower headers of a plurality of membrane modules and connected to a single mixing chamber including a single gas inlet constructed and arranged to introduce gas into the mixing chamber from above and through the manifold, wherein the gas inlet is horizontally centered between at least two of a plurality of membrane filtration modules, as recited in independent claims 1 and 35. Each of Cote '308, Zha, and Shimizu, alone or in combination, fail to disclose or suggest a manifold coupled to the lower headers of a plurality of membrane modules positioned above and connected to a chamber including a gas inlet constructed and arranged to introduce gas into the chamber in a downward direction from above and through the manifold, as recited in independent claim 12. Each of Cote '308, Zha, and Shimizu, alone or in combination, also fail to disclose or suggest a manifold coupled to a header in which the lower potting heads of a plurality of membrane filtration modules are mounted, the manifold positioned above a mixing chamber including a gas inlet spaced from and surrounded by side walls of the mixing chamber and configured to feed gas into the mixing chamber from above and through the manifold, as recited in independent claims 40 and 41.

The Examiner asserts on page 11 of the Office Action that Zha discloses a structure similar to Applicants' claimed plurality of membrane modules in paragraph [0059] which reads in part "the module 45 comprises a plurality of hollow fiber membrane bundles 46." The "plurality of hollow fiber membrane bundles 46" of Zha cannot, however, constitute membrane modules as claimed in the independent claims of the present application. Zha discloses that these "plurality of hollow fiber membrane bundles 46" form part of the module 45, i.e., a single

module. The "plurality of hollow fiber membrane bundles 46" are thus part of a single module and not modules unto themselves.

As discussed above, each of the independent claims of the present application recite a plurality of membrane modules having headers mounted in a single manifold and a mixing chamber coupled to the manifold into which gas is introduced by a gas inlet from above and through the manifold. In contrast, in each of the Cote Provisional, Zha, and Shimizu, a single membrane module is supplied with an aerating gas from a single chamber associated with the single module in which air is introduced directly below the filtration membranes. None of the Cote Provisional, Zha, or Shimizu disclose or suggest any way in which a plurality of the respectively disclosed membrane modules could be mounted together in a common manifold. Nor do any of the Cote Provisional, Zha, or Shimizu disclose or suggest any way in which the respectively disclosed membrane modules could be supplied with a gas from a single mixing chamber including a gas inlet passing downwardly through a manifold and positioned in the mixing chamber. Notably, there is no manifold disclosed in the respective apparatus of any of the Cote Provisional, Zha, or Shimizu through which the claimed air inlet could pass through.

As none of the Cote Provisional, Zha, and Shimizu, alone or in combination, disclose or suggest each and every element of any of independent claims 1, 12, 35, 40, and 41, none of these claims, or the claims which depend from these claims, can be obvious over Cote '308 in view of Zha or over Zha and Shimizu as evidenced by Cote '308.

B. Each of claims 1-3, 6, 9-14, 17, 20-22, 35, 40-48, and 54-56 is patentable over the asserted combination of Zha and/or Cote '308 in view of Shimizu and Henshaw.

There is no *prima facie* case of obviousness of claims 1-3, 6, 9-14, 17, 20-22, 35, 40-48, and 54-56 over Zha and/or Cote '308 in view of Shimizu, and further in view of Henshaw. The asserted combination of Zha and/or Cote '308, Shimizu, and Henshaw fails to disclose or suggest each and every element of any of these claims. Further, one of ordinary skill in the art would not have been motivated to have combined these references in the manner asserted *ab initio*.

The Examiner relies on Henshaw for teaching a "plurality of submerged membrane modules arranged in manifolds to have enlarged capacity treatment systems." The manifolds of Henshaw consist of piping which is used to withdraw permeate (permeate manifolds 135, 155)

from multiple membrane skeins and to deliver gas (air supply 145) to multiple membrane skeins. (See Henshaw FIG. 9). Even in the embodiments of Henshaw in which multiple membrane skeins are utilized in a common filtration tank, aeration gas is still delivered to each individual skein by individual air pipes. Further, these individual air pipes do not pass through any manifold. Henshaw thus discloses a structure which differs significantly from what is claimed in the present application and fails to cure the defect of Zha and/or Cote '308 in view of Shimizu discussed above to disclose or suggest each and every claim element of any of independent claims 1, 12, 35, 40, and 41. For example, the asserted combination of Zha and/or Cote '308, Shimizu, and Henshaw fails to disclose or suggest a gas inlet constructed and arranged to introduce gas into a single mixing chamber feeding a plurality of membrane modules in a downward direction from above the open base end of the mixing chamber, wherein the gas is fed from above and through a manifold as recited in independent claims 1, 12, 35, 40, and 41 or the claims which depend from these claims.

The reasons discussed above why one of ordinary skill in the art would not have been motivated to have combined Cote '308 with Zha, or Zha with Shimizu in the manner asserted by the Examiner apply equally well to the asserted combination of Zha and/or Cote '308, Shimizu, and Henshaw.

As such, each of claims 1-3, 6, 9-14, 17, 20-22, 35, 40-48, and 54-56 is patentable the asserted combination of Zha and/or Cote '308, Shimizu, and Henshaw.

C. Summary.

In view of the above, each of the rejections is improper and should be reversed. Appellant respectfully requests reversal of the rejections and issuance of a Notice of Allowance.

VIII. CLAIMS APPENDIX (37 C.F.R. § 41.37(c)(1)(viii))

1. (Previously Presented) A membrane filtration apparatus comprising:

a plurality of membrane filtration modules, each membrane filtration module comprising:

a plurality of porous membranes extending in an array, said plurality of porous membranes encased in a support structure and having lower ends mounted in a lower pot supported by a lower header and upper ends mounted in an upper pot supported by an upper header, said upper header configured to provide for permeate to be withdrawn from said upper ends of said plurality of porous membranes; and

a plurality of distribution apertures defined in said lower pot, said distribution apertures configured to distribute a scrubbing fluid into said module and along a surface or surfaces of said membranes;

a single manifold coupled to said lower header of each of said plurality of membrane filtration modules; and

a single chamber positioned below, and connected to, said manifold, said chamber constructed and arranged to promote upward flow of feed liquid therethrough, said chamber comprising:

an open base end in fluid communication with a source of feed liquid;

a second end in fluid communication with said distribution apertures; and

a single gas inlet constructed and arranged to introduce gas into said chamber in a downward direction from above the open base end, said gas fed from above and through said manifold and into said chamber, said gas inlet centered between at least two of said plurality of membrane filtration modules and configured to release gas into said chamber at a position vertically displaced below said at least two of said plurality of membrane filtration modules,

said chamber configured to mix gas and liquid to produce said scrubbing fluid and further configured to distribute said scrubbing fluid to said distribution apertures.

2. (Previously Presented) The membrane filtration apparatus according to claim 1 wherein the chamber is elongate.

3. (Previously Presented) The membrane filtration apparatus according to claim 1 wherein the length of said chamber is greater than that required to provide a static head, when the membrane is immersed in a liquid and gas introduced into the chamber, equivalent to the head loss for the gas to flow to said distribution apertures.

4. (Canceled)

5. (Canceled)

6. (Previously Presented) The membrane filtration apparatus according to claim 1 wherein the chamber is enclosed on all sides.

7. (Canceled)

8. (Canceled)

9. (Previously Presented) The membrane filtration apparatus according to claim 1 wherein the chamber comprises a plurality of sides positioned to form a skirt directly beneath a header or plurality of headers.

10. (Previously Presented) The membrane filtration apparatus according to claim 1 wherein said plurality of membrane filtration modules are arranged in the form of an extended linear array, and wherein the chamber has enclosed long sides.

11. (Previously Presented) The membrane filtration apparatus according to claim 10 wherein the chamber has unenclosed short sides.

12. (Previously Presented) An assembly of membrane modules comprising:

a plurality of porous membranes extending in an array and having lower ends mounted in a plurality of lower pots supported by a plurality of respective lower headers, and upper ends mounted in a plurality of upper pots supported by a plurality of respective upper headers, said

lower pots being configured to provide a number of distribution apertures therein for distributing a scrubbing fluid into said assembly of membrane modules and along a surface or surfaces of said membranes, said lower headers coupled to a manifold; and

a chamber positioned below and connected to said manifold, said chamber constructed and arranged to promote upward flow of feed liquid therethrough, said chamber comprising:

an open base end in fluid communication with a source of feed liquid;

a second end in fluid communication with said distribution apertures; and

a gas inlet constructed and arranged to introduce gas into said chamber in a downward direction from above the open base end, said gas fed from above and through said manifold,

said chamber configured to mix gas and liquid to produce said scrubbing fluid and further configured to distribute said scrubbing fluid to said distribution apertures.

13. (Previously Presented) The assembly of membrane modules according to claim 12 wherein the chamber is elongate.

14. (Previously Presented) The assembly of membrane modules according to claim 12 wherein the length of said chamber is greater than that required to provide a static head, when the membrane is immersed in a liquid and gas introduced into the chamber, equivalent to the head loss for the gas to flow to said distribution apertures.

15. (Canceled)

16. (Canceled)

17. (Previously Presented) The assembly of membrane modules according to claim 12 wherein the chamber is enclosed on all sides.

18. (Canceled)

19. (Canceled)

20. (Previously Presented) The assembly of membrane modules according to claim 12 wherein the chamber comprises a plurality of sides positioned to form a skirt directly beneath a header or plurality of headers.

21. (Previously Presented) The assembly of membrane modules according to claim 12 when arranged in the form of an extended linear array wherein the chamber has enclosed long sides.

22. (Previously Presented) The assembly of membrane modules according to claim 12 in the form of an extended linear array wherein the chamber has unenclosed short sides.

23. (Withdrawn) A method of removing a fouling material from a plurality of porous hollow fiber membranes mounted and extending longitudinally in an array to form a membrane module, the method comprising the steps of: providing a source of gas to a chamber in fluid communication with said membrane module; flowing the gas from the chamber into a base of the membrane module to form gas bubbles therein when said module is immersed in a liquid, whereby an upward flow of the gas bubbles across surfaces of the hollow fiber membranes is obtained, and whereby fouling materials are dislodged from the surfaces of the porous hollow fiber membranes.

24. (Withdrawn) A method according to claim 23 wherein the source of gas to the chamber is provided within the chamber.

25. (Withdrawn) A method according to claim 23 wherein the source of gas to the chamber is provided from below the chamber.

26. (Withdrawn) A method according to claim 23 wherein said chamber is elongate with one end open and the other end in fluid communication with the membrane module.

27. (Withdrawn) A method according to claim 26 wherein the gas is provided through the open end of the chamber.

28. (Withdrawn) A method of removing a fouling material from a plurality of porous hollow fiber membranes mounted and extending longitudinally in an array to form a membrane module, the method comprising the steps of: forming a mixture of gas bubbles and liquid within a mixing chamber; injecting the mixture into a base of the membrane module, whereby an upward flow of the mixture across surfaces of the hollow fiber membranes is obtained, and whereby fouling materials are dislodged from the surfaces of the porous hollow fiber membranes.

29. (Withdrawn) A method according to claim 28 wherein the step of forming a mixture comprises entraining the gas bubbles into a liquid stream.

30. (Withdrawn) A method according to claim 29 wherein the gas bubbles are entrained into said liquid stream by means of the chamber.

31. (Withdrawn) A method according to claim 29 wherein the gas bubbles are entrained or injected into said liquid stream by means of devices which forcibly mix gas into a liquid flow to produce a mixture of liquid and bubbles.

32. (Withdrawn) A method according to claim 23 wherein air entering the mixing chamber is deflected.

33. (Withdrawn) A method according to claim 32 wherein air entering the mixing chamber is deflected by way of a T-piece or baffle.

34. (Withdrawn) A method according to claim 32 wherein air entering the mixing chamber is deflected away from liquid entering the mixing chamber by way of a nozzle.

35. (Previously Presented) A membrane filtration apparatus comprising:

a plurality of membrane filtration modules, each membrane filtration module comprising a plurality of porous membranes, said membranes being arranged in close proximity to one another and having lower ends mounted in a lower pot supported by a lower header and upper

ends mounted in an upper pot supported by an upper header, said upper header configured to provide for permeate to be withdrawn from said upper ends of said porous membranes;

a manifold coupled to said lower headers;

an open-ended mixing chamber constructed and arranged to provide a cleaning mixture by mixing together liquid and gas bubbles, said chamber immersed in a feed tank and having an open base in fluid communication with a source of feed liquid, said chamber constructed and arranged to promote upward flow of feed liquid therethrough;

a gas source positioned within the open-ended mixing chamber, the gas source constructed and arranged to introduce gas through a single gas inlet into the open-ended mixing chamber in a downward direction from above the open base, said gas fed from above and through said manifold and into said chamber, said single gas inlet centered within said plurality of membrane modules; and

means for flowing said cleaning mixture along a surface of said membranes to dislodge fouling materials therefrom.

36. (Withdrawn) A method of removing fouling materials from the surface of a plurality of porous hollow fibre membranes mounted and extending longitudinally in an array to form a membrane module, said membranes being arranged in close proximity to one another, the method comprising the steps of forming a mixture of gas bubbles and liquid within a mixing chamber, said mixture being formed by said gas bubbles being entrained in said liquid by flowing said liquid past a source of gas so as to cause said gas to be drawn and/or mixed into said liquid, flowing said mixture into said membrane module such that said bubbles pass substantially uniformly between each membrane in said array to, in combination with said liquid flow, scour the surface of said membranes and remove accumulated solids from within the membrane module.

37. (Withdrawn) A method according to claim 36 wherein the membranes comprise porous hollow fibres, the fibres being fixed at each end in a header, the lower header having one or more holes formed therein through which mixture of gas/liquid is introduced from the mixing chamber.

38. (Withdrawn) A method according to claim 37 wherein the holes are circular, elliptical or in the form of a slot.

39. (Withdrawn) A method according to claim 36 wherein the membranes comprise porous hollow fibres, the fibres being fixed at each end in a plurality of headers, the lower headers being configured to provide a number of distribution apertures therebetween through which mixture of gas/liquid is introduced from the mixing chamber.

40. (Previously Presented) A membrane bioreactor comprising:

a plurality of membrane filtration modules, each membrane filtration module comprising a plurality of porous hollow membrane fibres extending longitudinally between and mounted between an upper and a lower potting head, said membrane fibres being arranged in close proximity to one another, said fibres being partitioned into a number of bundles at least at or adjacent to their respective potting head so as to form a space therebetween;

a header in which the lower potting head is supported;

a manifold coupled to the header;

an open-ended mixing chamber positioned below the lower potting head, said chamber constructed and arranged to promote upward flow of feed liquid therethrough, said chamber having an open base in fluid communication with a source of feed liquid; and

a gas inlet positioned within the open-ended mixing chamber, the gas inlet spaced from and surrounded by side walls of the open-ended mixing chamber and configured to feed gas into the open-ended mixing chamber from above and through said manifold,

wherein at least one of said potting heads includes an array of openings formed therein in fluid communication with said chamber constructed and arranged to provide gas bubbles within said module such that, in use, said bubbles move past the surfaces of said membrane fibres to dislodge fouling materials therefrom.

41. (Previously Presented) An assembly of membrane modules for use in a membrane bioreactor comprising:

a plurality of porous hollow membrane fibres extending longitudinally between and mounted between an upper and a lower potting head, said membrane fibres being arranged in

close proximity to one another, said fibres being partitioned into a number of bundles at least at or adjacent to their respective potting head so as to form a space therebetween;

a header in which the lower potting head is supported;

a manifold coupled to the header;

an open-ended mixing chamber positioned below the lower potting head, said chamber constructed and arranged to promote upward flow of feed liquid therethrough, said chamber having an open base in fluid communication with a source of feed liquid; and

a gas inlet positioned within the open-ended mixing chamber, the gas inlet spaced from and surrounded by side walls of the open-ended mixing chamber, and centrally located within the open-ended mixing chamber and configured to feed gas into the open-ended mixing chamber from above and through said manifold;

wherein said potting heads are configured to provide a number of distribution apertures therebetween in fluid communication with said chamber for providing gas bubbles within said assembly of membrane modules such that, in use, said bubbles move past the surfaces of said membrane fibres to dislodge fouling materials therefrom.

42. (Previously Presented) The assembly of membrane modules according to claim 41 wherein the liquid used is feed to the membrane module.

43. (Previously Presented) The assembly of membrane modules according to claim 41 wherein the fibres within the module have a packing density of between about 5 to about 70%.

44. (Previously Presented) The assembly of membrane modules according to claim 43 wherein the packing density is between about 8 to about 55%.

45. (Previously Presented) The assembly of membrane modules according to claim 41 wherein said holes have a diameter in the range of about 1 to 40 mm.

46. (Previously Presented) The assembly of membrane modules according to claim 45 wherein said holes have a diameter in the range of about 1.5 to about 25 mm.

47. (Previously Presented) The assembly of membrane modules according to claim 41 comprising a deflector within said mixing chamber configured to deflect gas away from the source of the liquid.

48. (Previously Presented) The assembly of membrane modules according to claim 41 including a nozzle whereby liquid is introduced into the mixing chamber.

49. (Withdrawn) A membrane bioreactor comprising a tank having means for the introduction of feed thereto, means for forming activated sludge within said tank, a membrane module or an assembly according to claim 41 positioned within said tank so as to be immersed in said sludge and said membrane module provided with means for withdrawing filtrate from at least one end of said fibre membranes.

50. (Withdrawn) A method of operating a membrane bioreactor of the type according to claim 49, comprising introducing feed to said tank, applying a vacuum to said fibres to withdraw filtrate therefrom while periodically or continuously supplying a cleaning mixture of gas bubbles and liquid formed in a mixing chamber through said openings to within said module such that, in use, said cleaning mixtures flows along the surface of said membrane fibres to dislodge fouling materials therefrom.

51. (Withdrawn) A membrane bioreactor according to claim 49 wherein a further source of aeration is provided within the tank to assist microorganism activity.

52. (Withdrawn) A membrane bioreactor according to claim 51 wherein the membrane module is suspended vertically within the tank and said further source of aeration is provided beneath the suspended module.

53. (Withdrawn) A membrane bioreactor according to claim 52 wherein the further source of aeration comprises a group of air permeable tube.

54. (Previously Presented) The membrane filtration apparatus of claim 1 wherein said gas inlet is fluidly connected to a source of gas within said chamber.

55. (Previously Presented) The membrane filtration apparatus of claim 54 wherein said source of gas is coupled to a gas line which runs through said header.

56. (Previously Presented) The assembly of membrane modules of claim 12 wherein said gas inlet runs through said header.

IX. EVIDENCE APPENDIX (37 C.F.R. § 41.37(c)(1)(ix))

None.

X. RELATED PROCEEDINGS APPENDIX (37 C.F.R. § 41.37(c)(1)(x))

None.

XI. CONCLUSION

For the reasons provided above, the rejections are improper and should be reversed. Appellant respectfully requests reversal of the rejections and issuance of a Notice of Allowance.

If there is any additional fee occasioned by this filing, including an extension fee that is not covered by an accompanying payment, please charge any deficiency to Deposit Account No. 50/2762, Ref. No. M2019-7027US.

Respectfully submitted,
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